

We claim:

1. A method for predicting properties of a subsurface reservoir which is a composite sedimentary body, comprising:

- 5 (a) determining at least part of an outline form of the composite body;
- (b) characterizing the properties of fundamental bodies in the composite body;
- (c) generating a fundamental body based on the characterized properties of the fundamental bodies;
- 10 (d) placing the fundamental body into the outline of the composite body;
- (e) repeating steps (c) through (e) until the outline of the composite body is substantially full of fundamental bodies.

2. The method of claim 1, wherein the properties of the fundamental bodies are characterized by a method chosen from the group consisting of: determining the local inlet properties of the flows which built the bodies, determining trends in the local inlet properties of the flows which built the bodies, determining statistical distributions of the local inlet properties of the flows which built the bodies, and any combination thereof.

3. The method of claim 2, wherein the local inlet properties are chosen from the group consisting of: flow velocity at the inlet, flow height at the inlet, suspended sediment volume within at least one grain size range at the inlet, inlet width, flow duration, inlet location, order in which the inlet is active relative to local inlets of other fundamental bodies, and any combination thereof.

4. The method of claim 1, wherein the properties of the fundamental body comprise at least one member of the group: shape of the body, size of the body, height of the body, grain size distribution in at least one point within the body, bedding type in at least one point within the body, degree of erosional scour below the  
5 body associated with deposition of the body, shape of a channel feeding sediment to the inlet, size of a channel feeding sediment to the inlet, degree of erosional scour caused by a channel feeding sediment to the inlet, at least one property of sediment which forms a channel feeding sediment to the inlet, at least one property of sediment which subsequently fills the channel feeding sediment to the inlet, and any  
10 combination thereof.
5. The method of claim 1, wherein at least part of the outline form of the composite body is determined from seismic data.
6. The method of claim 1, wherein the properties of at least one fundamental body are determined using grain size and body thickness measurements from a well  
15 sample.
7. The method of claim 1, wherein the properties of at least one fundamental body are determined by using at least part of the outline form of the fundamental body.
8. The method of claim 1, wherein characterizing the properties of the  
20 fundamental bodies throughout the composite body includes at least determining properties of fundamental bodies from the outline form of the composite body.
9. The method of claim 2, wherein the possible range of the inlet flow properties is constrained by mathematical relationships between at least two of the inlet flow properties.

10. A method for predicting the properties of a subsurface reservoir which is a composite sedimentary body, comprising:

- (a) determining at least part of an outline form of the composite body;
- 5 (b) determining at least part of the outline form of at least one fundamental body within the composite body;
- (c) determining properties of at least one fundamental body within the composite body;
- (d) characterizing the properties of the fundamental bodies in the composite body;
- 10 (e) generating a fundamental body to be placed in the composite body outline;
- (f) placing the fundamental body into the outline of the composite body;
- (g) repeating steps (e) through (g) until the outline of the composite body is substantially full of fundamental bodies.

15 11. The method of claim 10, wherein the properties of the fundamental bodies are characterized by a method selected from the group consisting of: determining the local inlet properties of flows which built the bodies, determining trends in the local inlet properties of flows which built the bodies, determining statistical distributions of the local inlet properties of flows which built the bodies, and any combination thereof.

20 12. The method of claim 11, wherein the local inlet properties include are chosen from the group consisting of: flow velocity at the inlet, flow height at the inlet, suspended sediment volume within at least one grain size range at the inlet, inlet width, flow duration, inlet location, order in which said inlet is active relative to local inlets of other fundamental bodies, and any combination thereof.

13. The method of claim 10, wherein the properties of the fundamental bodies comprise at least one member of the group: shape of the body, size of the body, height of the body, grain size distribution in at least one point within the body, bedding type in at least one point within the body, degree of erosional scour below the body  
5 associated with deposition of the body, shape of the channel feeding sediment to the inlet, size of the channel feeding sediment to the inlet, degree of erosional scour caused by the channel feeding sediment to the inlet, at least one property of sediment which forms the channel feeding sediment to the inlet, at least one property of sediment which subsequently fills the channel feeding sediment to the inlet, and any  
10 combination thereof.
14. The method of claim 10, wherein at least one part of the outline form of the composite body is determined from seismic data.
15. The method of claim 10, wherein at least part of the outline form of at least one fundamental body is determined from seismic data.  
15 16. The method of claim 11, wherein the possible range of the inlet properties is constrained by mathematical relationships between at least two of the inlet flow properties.
17. A method for predicting properties of a subsurface reservoir which is a composite sedimentary body, comprising:  
20 (a) determining at least part of an outline form of the composite body;  
(b) measuring thickness and grain size distribution at one point in at least one fundamental body within the outline of the composite sedimentary body;

- (c) determining properties of at least one fundamental body within the composite body from a point measurement of thickness and grain size distribution within the fundamental body;
- 5 (d) characterizing the properties of the fundamental bodies throughout the composite body;
- (e) generating a fundamental body to be placed in the composite body outline;
- 10 (f) placing the fundamental body into the outline of the composite body;
- (g) repeating steps (e) through (g) until the outline of the composite body is substantially full of fundamental bodies.

18. The method of claim 17, wherein the properties of the fundamental bodies are characterized by a method selected from the group consisting of: determining the local inlet properties of flows which built the bodies, determining trends in the local inlet properties of the flows which built the bodies, determining statistical distributions of the local inlet properties of the flows which built the bodies, and any combination thereof.

19. The method of claim 18, wherein the local inlet properties are chosen from the group consisting of: flow velocity at the inlet, flow height at the inlet, suspended sediment volume within at least one grain size range, inlet width, flow duration, inlet location, order in which said inlet is active relative to local inlets of other fundamental bodies, and any combination thereof.

20. The method of claim 17, wherein the properties of the fundamental body comprise at least one member of the group: shape of the body, size of the body, height of the body, grain size distribution in at least one point within the body, bedding type in at least one point within the body, degree of erosional scour below the body associated with deposition of the body, shape of a channel feeding sediment to the

inlet, size of a channel feeding sediment to the inlet, degree of erosional scour caused by a channel feeding sediment to the inlet, at least one property of sediment which forms the channel feeding sediment to the inlet, at least one property of sediment which subsequently fills a channel feeding sediment to the inlet, and any combination  
5 thereof.

21. · The method of claim 17, wherein at least part of the outline form of the composite body is determined from seismic data.
22. · The method of claim 17, wherein the properties of the fundamental bodies are determined by using at least part of the outline form of the composite body..
- 10 23. · The method of claim 18, wherein the possible range of the inlet properties is constrained by mathematical relationships between at least two of the inlet flow properties.